

DOCKET NO: A-98-49, Item II-A4-54

**WASTE CHARACTERIZATION REPORT
DESK-TOP REVIEW
EPA INSPECTION NO. EPA-Hanford-12.04-8
OF THE HANFORD SITE**

**U.S. Environmental Protection Agency
Office of Radiation and Indoor Air
Center of Federal Regulations
1200 Pennsylvania Ave., NW
Washington, DC 20460**

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ATTACHMENTS

Attachment A Acceptable Knowledge Checklist for Inspection

1.0 EXECUTIVE SUMMARY

In accordance with 40 CFR 194.24, during March and April 2005, the U.S. Environmental Protection Agency (EPA or the Agency) conducted EPA Inspection No. EPA-Hanford-12.04-8 of the Hanford Site in the State of Washington to verify that waste proposed for disposal in the Waste Isolation Pilot Plant (WIPP) could be characterized as required by 40 CFR 194.24(c)(4).

EPA must verify compliance with 40 CFR 194.24 before waste may be disposed of at the WIPP, as specified in Condition 3 of the Agency's certification of the WIPP's compliance with disposal regulations for transuranic (TRU) radioactive waste (63 *Federal Register* (FR) 27354, 27405, May 18, 1998).

In June 2003, EPA inspected Hanford's waste characterization (WC) processes for characterizing Plutonium Finishing Plant (PFP) solid waste. During this inspection, however, EPA did not examine the acceptable knowledge (AK) process but inspected the other WC processes (radioassay, radiography, visual examination, and WIPP Waste Information System) implemented by Hanford to demonstrate to EPA the adequacy of its TRU WC program. In an August 7, 2003, letter to the Carlsbad Field Office (CBFO) transmitting the results of the June 2003 inspection, EPA specifically stated that "EPA has not approved acceptable knowledge for TRU solids, specifically ash and mixed oxides, characterized at the PFP facility. As a result, DOE may not dispose at the WIPP any ash and mixed oxides from the PFP facility." This restriction was based on EPA's inability to fully evaluate and approve AK documentation as part of the WC for the PFP solid wastes.

In September 2004, EPA discovered that, between July 25 and September 4, 2004, the U.S. Department of Energy (DOE) had incorrectly shipped and emplaced in the WIPP approximately 600 drums of PFP solid waste (ash) from Hanford. DOE immediately halted Hanford from further shipment of any PFP solid waste to the WIPP for disposal. EPA concurred with DOE's decision to cease all future shipments pending EPA review and approval. DOE provided analysis supporting its claim that the PFP drums emplaced in the WIPP repository can safely remain underground. Under EPA regulations, without EPA approval, DOE cannot certify any waste from TRU waste sites for disposal at the WIPP. Thus, CBFO's certification of Hanford PFP solids for disposal at the WIPP conflicted with EPA's site approval and violated EPA regulations at 40 CFR 194.8 and 40 CFR Part 24. DOE agreed to take steps to identify the cause of the error and prevent recurrence. In a November 12, 2004, letter to DOE, EPA concluded that the mixed oxides were adequately characterized and emplaced as part of the debris waste stream.

In November 2004, EPA issued an FR notice announcing its intention to evaluate AK documentation related to PFP solids and the availability of Hanford's TRU WC program documents (69 FR 69569, November 30, 2004). This FR notice opened a 30-day public comment period. Stakeholders requested additional review time, which EPA granted by extending the public comment period until January 30, 2005. EPA's response to public comments is in Section 8.0 of this report. The notice also announced that EPA would conduct a desk-top review of the AK documentation specific to the Hanford PFP solids and may interview AK staff by phone. This desk-top review was necessary because, while EPA had approved the

other components of the system of controls, EPA had not approved the AK process used to characterize this waste stream. Earlier this year, EPA reviewed the Hanford AK documentation for PFP solids and requested additional documentation to complete the review.

EPA's desk-top inspection of the AK documentation for the PFP solid waste included the verification of the waste pedigree—defense determination, S3000 waste category determination, absence of liquids confirmation, and classification as TRU waste. Based on the desk-top review of the AK, EPA determined that the AK documentation for the PFP's retrievably stored contact-handled solid waste at Hanford is technically adequate. EPA identified no findings and four concerns, none of which requires response at this time. EPA will discuss with Hanford AK staff the AK concerns resulting from the desk-top review during the upcoming inspection scheduled for June 20–24, 2005.

The table below provides a summary of EPA's WC approvals for Hanford waste categories characterized at the Waste Recycling and Processing Plant (WRAP) and the PFP.

WC Processes	WRAP Debris Waste	PFP Debris Waste	PFP Solid Waste
Acceptable Knowledge	Approved—June 2000	Approved—August 2002	Approved—June 2005
Nondestructive Assay	<ul style="list-style-type: none"> — Canberra GEA-A: Approved—June 2000 — Canberra GEA-B: Approved—August 2002 — IPAN A & B: Approved—August 2003 	<ul style="list-style-type: none"> — SGSAS in Room 172: Approved—August 2002 — SGSAS w/ANTECH AR-1 calorimeter: Approved—August 2003 — SGSAS w/ANTECH AR-5, AR-8, P-13, P-14, P-15, Q-1 calorimeters: Approved—October 2003 	<ul style="list-style-type: none"> — SGSAS w/ANTECH AR-1 calorimeter: Approved—August 2003 — SGSAS w/ANTECH AR-5, AR-8, P-13, P-14, P-15, Q-1 calorimeters: Approved—October 2003
Visual Examination & Real-Time Radiography	Approved—June 2000	Approved—April 2002	Approved—August 2003
WIPP Waste Information System	Approved—June 2000	Approved—June 2000	Approved—June 2000
Load Management	Not approved	Not approved	Not approved

2.0 PURPOSE OF INSPECTIONS

On May 18, 1998, the U.S. Environmental Protection Agency (EPA or the Agency) certified that the Waste Isolation Pilot Plant (WIPP) will comply with the radioactive waste disposal regulations at 40 CFR Part 191. In this certification, EPA also included Condition No. 3, which states that “the Secretary shall not allow shipment of any waste from . . . any waste generator site other than LANL [Los Alamos National Laboratory] for disposal at the WIPP until the Agency has approved the processes for characterizing those waste streams for shipment using the process set forth in §194.8.” The approval process described at 40 CFR 194.8 requires the U.S. Department of Energy (DOE or Department) to (1) provide EPA with information on process knowledge¹ for waste streams proposed for disposal at the WIPP and (2) implement a system of controls used to confirm that the total amount of each waste component that will be emplaced in the WIPP will not exceed limits identified in the WIPP Compliance Certification Application (CCA). An EPA inspection team visits the site to verify through a demonstration that process knowledge and other elements of the system of controls are technically adequate and are being implemented properly. Specifically, the EPA inspector verifies compliance with 40 CFR 194.24(c)(4), which states the following:

Any compliance application shall: . . . Provide information which demonstrates that a system of controls has been and will continue to be implemented to confirm that the total amount of each waste component that will be emplaced in the disposal system will not exceed the upper limiting value or fall below the lower limiting value described in the introductory text of paragraph (c) of this section.² The system of controls shall include, but shall not be limited to: measurement; sampling; chain of custody records; record keeping systems; waste loading schemes used; and other documentation.

In other words, the purpose of inspections is to verify that the DOE waste generator sites, which characterize transuranic (TRU) waste prior to shipment to the WIPP, are characterizing and tracking the waste in such a manner that EPA is confident that the waste will not exceed the approved limits. By approving WC systems and processes at the Hanford site, EPA has evaluated capabilities of those systems and processes that can accomplish two tasks: (1) they can identify and measure the waste components (such as plutonium) that must be tracked for compliance³, and (2) they can confirm that the waste in any given container has been properly

¹ Process knowledge refers to knowledge of waste characteristics derived from information on the materials or processes used to generate the waste. This information may include administrative, procurement, and quality control documentation associated with the generating process, or past sampling and analytic data. Usually, the major elements of process knowledge include information about the process used to generate the waste, material inputs to the process, and the time period during which the waste was generated. In the context of these reports specifically and waste characterization (WC) generally, EPA uses the term “acceptable knowledge” synonymously with “process knowledge.”

² The introductory text of paragraph 40 CFR 194.24(c) states, “For each waste component identified and assessed pursuant to [40 CFR 194.24(b)], the Department shall specify the limiting value (expressed as an upper or lower limit of mass, volume, curies, concentration, etc.), and the associated uncertainty (i.e., margin of error) for each limiting value, of the total inventory of such waste proposed for disposal in the disposal system.”

³ The potential contents of a waste stream or group of waste streams determine which processes can adequately

identified as belonging to the group of approved waste streams. Under 40 CFR 194.8(b)(4), EPA is authorized to perform followup inspections to verify that a TRU waste site is properly characterizing the relevant waste streams and that it is shipping waste that belongs only to those waste streams or groups of waste streams that have been characterized by the approved WC processes.

3.0 PURPOSE OF THIS REPORT

This WC inspection report documents the basis for EPA's approval decision and explains the results of Inspection No. EPA-Hanford-12.04-8 in terms of findings or concerns. The report provides objective evidence of outstanding findings (nonconformances) in the form of documentation, if applicable. The report also describes any tests or demonstrations completed during the course of the inspection. The completed checklist attached to the report references the documents (principally procedures) that the EPA inspection team reviewed. To review any items identified in the attached checklist, please contact:

Quality Assurance Manager
USDOE/Carlsbad Field Office
P.O. Box 3090
Carlsbad, NM 88221

EPA's decision to approve or disapprove the system of controls (processes) used to characterize one or more waste streams at a site is conveyed to DOE separately by letter, in accordance with 40 CFR 194.8(b)(3). This report identifies and explains the basis for EPA's decision, as contained in the letter. EPA's approval or disapproval extends only to the processes reviewed during the inspection and identified in this report and its attachments. Only waste that can be adequately characterized using processes verified by EPA through inspection or surveillance may be shipped to the WIPP for disposal.

4.0 SCOPE OF INSPECTION

The scope of Inspection No. EPA-Hanford-12.04-8 incorporated the verification of technical adequacy of the system of controls used to characterize the activities of the 10 WIPP-tracked radionuclides (^{241}Am , ^{137}Cs , ^{238}Pu , ^{239}Pu , ^{240}Pu , ^{242}Pu , ^{90}Sr , ^{233}U , ^{234}U , and ^{238}U), as well as components requiring waste limits using AK.

characterize the waste. For example, if acceptable knowledge (AK) information suggests that the waste form is heterogeneous, the site should select a nondestructive assay technique that suits such waste in order for adequate measurements to be obtained. Radiography and visual examination help both to confirm and quantify waste components such as cellulose, rubbers, plastics, and metals. Once the nature of the waste has been confirmed, the assay techniques then quantify the radioactive isotopes in the waste. In the given example, a TRU waste site may be able to characterize a wide range of heterogeneous waste streams or only a few. EPA's inspection scope is governed by a site's stated limits on the applicability of proposed WC processes.

5.0 DEFINITIONS

Finding: A determination that a specific item or activity does not conform with 40 CFR 194.24(c)(4). A finding requires a response from the Carlsbad Field Office (CBFO).

Concern: A judgment that a specific item or activity may or may not have a negative effect on compliance and, depending on the magnitude of the issue, may or may not require a response.

6.0 INSPECTION TEAM

The EPA WC inspector was Ms. Connie Walker, of SC&A, Inc.

7.0 PERFORMANCE OF THE INSPECTION

Hanford, located along the Columbia River near Richland, Washington, is a 560-square-mile area managed by DOE. Hanford was established in secrecy during World War II to produce plutonium for U.S. nuclear weapons. Peak production years were reached in the 1960s when eight reactors were operating at Hanford. All weapons material production was halted in the late 1980s. Hanford is now engaged in the world's largest environmental cleanup project. TRU wastes (i.e., wastes containing greater than 100 nCi/g TRU) generated at Hanford during the production years and during environmental cleanup are destined for disposal at the WIPP, the geologic repository for the disposal of the nation's TRU wastes. Hanford is also an interim storage facility for TRU-contaminated waste, including defense waste.

EPA Inspection No. EPA-Hanford-12.04-8 took place during March and April 2005. The inspection involved the AK element of Hanford's TRU WC program. This element constitutes a sampling of the "system of controls" for WC that is identified in 40 CFR 194.24(c)(4).

EPA examined AK in the Hanford TRU WC program to verify that Hanford demonstrated compliance with 40 CFR 194.24 for the waste streams being examined (i.e., S3000 wastes). The checklist used by the EPA inspector for the AK verifications is included in Attachment A. The checklist identifies the objective evidence reviewed by EPA.

The inspection was conducted according to the following steps:

- (1) Preparation of draft checklists prior to the inspection
- (2) Review of the results of recent EPA and CBFO audits of Hanford, including findings/concerns identified by EPA and corrective actions required by CBFO (this background information suggests potential areas of inquiry during interviews)
- (3) Review of site procedures and other information and modification of EPA checklists, if necessary, to incorporate site-specific information
- (4) Desk-top verification of the technical adequacy or qualifications of personnel, procedures, and equipment by means of interviews and demonstrations

The following subsection addresses the results of EPA’s inquiries into the AK technical area. The checklist attached to this report (Attachment A) identifies, as appropriate, key documents that the EPA inspector reviewed and key site personnel who were interviewed via telephone. The following key personnel were interviewed.

Personnel Contacted during the Audit

Personnel	Organization/Function	Area of Expertise
Scott Bisping	Hanford/AK Expert	Acceptable Knowledge

7.1 Acceptable Knowledge

AK is used to help determine the following aspects of TRU wastes for the Hanford program:

- General waste material parameter (WMP) content of waste
- Radionuclide content of waste with respect to identifiable isotopic ratios of the EPA 10 radionuclides and other radionuclides, and nature of waste with respect to TRU vs. non-TRU content and related waste management issues
- Waste processes that generated waste, including, but not limited to, location of waste generation, programmatic considerations, and buildings in which wastes were generated
- Waste stream determination
- Defense waste status

EPA Inspection No. EPA-Hanford 12.04-8 was performed to evaluate compliance of the program for characterizing retrievably stored solid waste (S3000). To accomplish this, several technical elements were assessed. The checklist at Attachment A includes objective evidence examined to assess these elements:

- Overall procedural technical sufficiency and scope, with emphasis on tracking of the AK WC process for individual containers and waste streams
- Characterization of WMPs and radionuclides as required by 40 CFR 194.24; DOE/WIPP-02-3122, “Contact-Handled Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant,” Revision 3, dated April 25, 2005 (the revised CH-WAC); and attachments to the CCA
- Compilation of AK information and use of supplemental information
- Confirmation of AK and resolution of discrepancies
- Technical adequacy of AK characterization results
- Preparation of the AK summary
- Technical adequacy of required procedures (e.g., a consistent definition of waste streams)
- Reassignment of any waste based on an analysis of AK and discrepancies

- Appropriate determination of AK accuracy

The following documents were among those examined to assess these issues and include those evaluated to determine whether AK data assembly, compilation, confirmation, and accuracy assessments were adequately performed:

- WMP-400, Waste Isolation Pilot Plan (WIPP) Procedures, Acceptable Knowledge Documentation Management, Section 7.1.9, Revision 15, December 2003
- M4T00-DCD-02-228, Surveillance Report TRU-02-S-009, Assessment of Acceptable Knowledge Activities at the Site Project Office, October 15, 2002
- TRU Project Training Summary, Scott Bisping, September 18, 2003, and June 9, 2003
- M4T00-PJC-02-076, Sr-90 to Cs-137 Ratio for Appendix E of Hanford Site Transuranic Waste Certification Plan for NDA, April 11, 2002
- TRU-SPO-11.4.3-0408200229939, Criticality Safety, April 3, 2002
- TRU-SPO-11.4.1-0408200226866, e-mail record—information regarding the evaluation of ^{234}U and ^{90}Sr , approved April 11, 2002
- TRU-SPO-11.4.3-0408200231426, Hanford Defined Waste Model Limitation and Improvements, HN 3273, stamped December 18, 1998; Revision 0A, April 8, 2002
- TRU-SPO-11.9-0723200432715, WIPP Waste Stream Profile Form and Data Summary Form for RLRFETS.001, October 14, 2004
- TRU-SPO-11.9-0319200350285, Time Frame That RFETS Ash Was Shipped to Hanford, including a Record of Communication, March 31, 2003
- M4T00-DCD-03-062, Waste Stream-Specific Document RFETS01, Revision 2 for the Acceptable Knowledge Documentation Management Program for the TRM Incinerator Ash from Rocky Flats Environmental Technology Site, Waste Stream RFETS01, June 9, 2003
- M4T00-PJC-02-125, Program Document (HNF-3561, Draft Revision 7) for the Acceptable Knowledge Documentation Management Program, June 18, 2002
- WIPP Waste Stream Profile Form (WSPF) for Hanford No. RLMHASH.01, Transuranic Inorganic Homogenous Solid Waste, July 13, 2004
- M4T00-PJC-02-077, U-234 to U-235 and U-234 to U-238 Ratios for Appendix E of Hanford Site Transuranic Waste Certification Plan for NDA, April 11, 2002
- TRU-SPO-11.4.4-0817200045383, Waste Profile Sheet: Rocky Flats Ash Residues, August 21, 2000
- Nondestructive Assay (NDA) Batch Data Report (BDR) PFP-TB-2001-028 for Billet Cans 100-01-02-269, 272, 278, 277, 275, and 282 (partially complete), March 7, 2002
- Visual Examination (VE) Technique BDR, PFP-VE-2002-016

- TRU-SPO-11.4.1-0817200045262, Acceptable Knowledge from Rocky Flats Environmental Technology Site for SS&C and Incinerator Ash, August 21, 2000
- Interoffice Memo: Sr-90 to Cs-137 Ratio for Appendix E of Hanford Site Transuranic Waste Certification Plan for NDA to document compliance with the requirements set forth in Appendix E; Attachment 1: Raw Data; Attachment 2: PUREX-Related Data Sort; Attachment 3: Ratio Graph; Attachment 4: Fission-Product Yield Curve of U-235; Attachment 5: Ratio of Cs-137 to Sr-90 Yields, April 11, 2002
- AK Source Document Summary: TRU Waste Management Program Information & Waste Stream Specific Information—Evaluations of U-234 & Sr-90 and Preliminary Results with Graphs, April 8, 2002
- WMP-400 Section 7.1.9, Waste Isolation Pilot Plant Procedures: AK Documentation Management: Procedure Approvals, minor change, Revision 13, November 20, 2002
- Interoffice Memo: AK Information in the Fourth Revision for the TRM Incinerator Ash from the Rocky Flats Environmental Tech Site Stored and Packaged at the PFP, June 9, 2004
- Records of Transmittal Form: TRU Waste Certification Program: Waste Stream-Specific Document RFETS01, Revision 6 of the Hanford Site Transuranic Waste Management Waste-Specific AK for Incinerator Ash from Rocky Flats Environmental Technology Site—Waste Characterization and Certification, Attachment 1, June 21, 2004
- Records Transmittal Sheet: TRU-SPO-11.9-0619200338439, AK-AK Document Discrepancy Resolution Example, RFETS Ash Dates of Generation, June 19, 2003
- Data package for POP Container 30438 (VE technique data sheet), February 21, 2001
- Data package for POP Container 30438 (NDA BDR 2001-028)
- Data package for POP Container 30433 (NDA BDR 2001-028), December 18, 2001
- Data package for POP Container 30433 (VE technique data sheet), March 8, 2001
- WMP Training Bulletin, July 21, 2004
- Plutonium Finishing Plant Administration FSP-PFP-5-8, Volume 2, Data Management, 16.2, Revision 9, Change 0, May 25, 2004
- M4T00-TRU-04-467, Waste Stream-Specific Document MHASH01, Revision 4 for the Acceptable Knowledge Documentation Management Program for the Hanford Incinerator Ash Waste Stream MHASH01, June 17, 2004
- M4T00-TRU-04-0468, Waste Stream-Specific Document RFETS01, Revision 6 of the Hanford Site Transuranic Waste Management Waste Specific Acceptable Knowledge Documentation for Incinerator Ash from Rocky Flats Environmental Technology Site, Waste Stream RFETS01, June 17, 2004
- M4T00-DCD-05-282, Acceptable Knowledge Performance Report for 299 Containers from Waste Stream MHASH01, April 11, 2005

- M4T00-DCD-03-489.1, Acceptable Knowledge Confirmation Checklist for 15 Containers from Waste Stream MHASH01, March 17, 2004
- Acceptable Knowledge Re-Evaluation Checklist, Hanford ash mixed TRU, addition of silver toxicity based on analytical results, signed January 2, 2004
- M4T00-TRU-04-456.1, Acceptable Knowledge Documentation Checklist for Waste Streams NPFPD ... NHASH01, and SS&C01, June 17, 2004
- Waste Isolation Pilot Plant (WIPP) Procedures, Revision 15, Section 7.1.7, Transuranic Waste Container Management Activities, Effective March 22, 2005
- TRU-SPO-11.4.4-0226200132290, General Description and Characterization of Hanford Generated Ash Residue, December 2000
- M4T00-TRU-03-534, Transmittal of the Waste Stream-Specific Document MHASH01 Revision 3 for the Acceptable Knowledge Documentation Management Program for the Hanford Incinerator Ash, Waste Stream MHASH01, December 2, 2003

Information for the following drums and associated BDRs were requested for examination:

Drum/POC Number	VE Technique	NDA Billet Cans	NDA BDR Examined
RHZ-214-30443	PFP-VE-2001-008	100-01-02-269	PFP-TB-2001-028
RHZ-214-30439—only VE T provided	PFP-VE-2001-008	100-01-02-272	PFP-TB-2001-028
RHZ-214-30310	PFP-VE-2001-008	100-01-02-278	PFP-TB-2001-028
RHZ-214-30369	PFP-VE-2001-008	100-01-02-277	PFP-TB-2001-028
RHZ-214-30370	PFP-VE-2001-008	100-01-02-275	PFP-TB-2001-028
RHZ-214-30438	PFP-VE-2001-008	100-01-02-282	PFP-TB-2001-028

The EPA inspector assessed the following aspects of the AK process:

- (1) The AK summaries for the Hanford ash material (M4T00-TRU-03-550) attached to WSPF RLMHASH.001 and Rocky Flats Environmental Technology Site (RFETS) incinerator ash (M4T00-TRU-03-487) attached to WSPF RLRFETS.001 were examined for technical adequacy and completeness.

The AK summaries examined contain general information from supporting documentation and also includes some mandatory AK information to show compliance with CH-WAC requirements. However, the AK summary does not adequately reference the source of the information provided, so it was not possible to check the sources identified in the AK summary attached to the WSPF. The radionuclide discussion in the AK summary is generic, and the explanation for the two waste streams covered in WSPFs for their origin is inadequate in terms of different processes/sites (e.g., common source of feed material). The radionuclide discussions should be specific to the waste streams described and should provide general isotopic distributions, identification of the two most prevalent isotopes expected, and other CH-WAC requirements. In the case of the RFETS and Hanford ash waste streams, the identical discussions included no references for the

isotopes identified that would have allowed verification of statements being made. While WMPs were presented, the source of the information discussed was not referenced, and hence it was difficult to determine the approximate distribution of WMPs within each container. In addition, performance assessment is directly impacted by the amount of cellulose, plastics, and rubber and ferrous and non-ferrous metals present in waste, so AK summaries should ensure that these critical parameters for risk assessment are addressed or appraised in some fashion. Adequate references to supporting documents addressing WMPs are also required. Determination of both the radionuclide content and WMPs in a supportable and defensible fashion is part of an adequate system of controls as required under 40 CFR 194.24(c).

(2) AK data limitations were evaluated.

The site identified AK source document limitations on the AK source document summary, in a specific boxed area entitled, "Source Document Data Limitations." In one of the specific examples provided, however, this box was left completely blank, making it difficult to determine whether this omission was because no limitations were identified, or whether the question was simply overlooked. All AK source document summaries must include some indication in this box as to whether a limitation was or was not identified.

(3) Overall procedural technical sufficiency and scope, with emphasis on the tracking of the AK WC process for individual containers and waste streams, was evaluated.

The site provided Procedure WMP-400, Section 7.1.7, which described the process for controlling containers during the site's TRU waste project characterization and certification activities. No direct listing of containers was provided, and the referenced document did not describe the computerized data management system used at the site to track and manage containers. This data system was not found to be deficient previously. However, EPA was not able to check the system in place directly through this desk-top review. EPA will check the workings of this system at the next site inspection to ensure that the system can appropriately track containers.

(4) Characterization of WMPs and radionuclides was examined, as required by 40 CFR 194.24, the revised CH-WAC, and attachments to the CCA.

As indicated above, the AK summaries attached to WSPFs include limited information pertinent to the WMPs and radionuclides. Similarly, AK support document M4T00-DCD-04-468 focuses on the hazardous constituents in RFETS ash and prohibited items within the ash waste, without much information pertaining to the presence of radionuclide content or WMPs as in trace or substantial quantities. Table 1 of this document does not identify which of the WMPs (e.g., other metals, inorganic materials, etc.) are likely to be present in the waste. The table should clarify what "surrogate" material would be present (see Section 3.0) and which WMPs this material might represent. Further, radionuclide

discussion is limited and does not address elements pertinent to the CH-WAC, including the two most prevalent radionuclides.

M4T00-DCD-04-048 does not discuss whether load management (Appendix E) is to occur, and, if so, it lacks the required <100 nCi/g information. Further, the specific isotopic distributions for weapons- and fuel-grade plutonium are lacking. The origin and expected quantity of depleted uranium (DU)/ enriched uranium (EU) should be addressed. If Plutonium Finishing Plant (PFP) solids were to be load managed in the future, this information must be included.

(5) Compilation of AK information and use of supplemental information were assessed.

The site provided examples of supplemental information, including a 2002 memorandum addressing the $^{90}\text{-}^{137}\text{Cs}$ ratio determination and the ^{234}U , ^{235}U , and ^{238}U ratios to comply with internal Hanford Certification Plan requirements. EPA has examined both of these documents under previous inspections. Both documents concern the use of TWINS as well as the Hanford Defined Waste Model. The documents basically conclude that while there may be limitations, the results are “representative of all wastes generated at the Hanford site.” However, the use of this information for waste sourced from RFETS requires additional justification, particularly since the RFETS ash in question was generated in a specific building (771), has specific EU and DU isotopic distributions associated with it by RFETS AK documentation, and may have additional information available for it from ongoing (or recently completed) RFETS characterization of the same waste material.

(6) Confirmation of AK and resolution of discrepancies were evaluated.

An example AK-AK discrepancy resolution was provided for review pertaining to the generation and shipment dates of RFETS ash material to Hanford. This example showed that the site attempted to rectify this example discrepancy and adequately documented the discrepancy and its resolution.

(7) Technical adequacy of AK characterization results was examined.

AK information was documented in M4T00-DCD-04-468 for RFETS-originated incinerator ash that was subsequently shipped to Hanford for processing. The document does not integrate or include radionuclide information obtained through characterization of the source waste stream at RFETS. Inclusion and integration of this information in the AK documentation should be completed the next time this document is updated. If this information is not applicable to Hanford ash, then a statement to that effect should be included as well as an explanation of why this is so (e.g., whether Hanford processing altered the RFETS radionuclide occurrence/distribution).

(8) Training and abilities of AK personnel and data management and tracking could not be completely evaluated.

Training record documentation for Mr. Scott Bisping was provided for 2003; however, 2004 documentation was not included. Mr. Bisping's expertise was assessed as part of previous EPA inspections, and it was determined at that time that he possessed adequate technical knowledge and skills. The process of a desk-top review did not allow for adequate verification of the continuing technical capabilities of the AK expert or assessment of the data management and tracking system that can only be performed through onsite examination of the process. It is assumed that since these elements were adequate at previous EPA inspections they remain so at this time, since they are not specific to a particular summary waste category group.

- (9) Reassignment of any waste based on an analysis of AK and discrepancies was assessed.

Information regarding the reassignment of waste was requested, and site representatives indicated that none of the RFETS or Hanford ash had been reassigned based on NDA/VE-AK discrepancies.

- (10) Appropriate determination of AK accuracy was evaluated.

AK is confirmed by comparing it with the results of nondestructive evaluation (NDE), consisting of real-time radiography and VE techniques. If NDE does not validate AK results, the site generates a nonconformance report for the affected containers. The results from such a comparison, which would directly affect AK accuracy, were not included in the AK accuracy report. DOE had identified this issue as CBFO Corrective Action Requirement (CAR) 03-064 in a previous audit. The AK accuracy report dated April 11, 2005, included a 13-page attachment showing the radiological data inconsistency assessments for each container included in the AK performance evaluation. This multipage assessment did not clarify the criteria that were used to evaluate radiological inconsistencies.

- (11) NDA-AK personnel communication was assessed.

EPA asked for documentation pertaining to AK-NDA personnel communication, including communication regarding the adequacy and use of default isotopes based on AK by NDA personnel, as well as communication of AK data limitations to NDA personnel. In response, the site provided a WMP training bulletin that showed that the course object is to inform VE personnel, but it made no mention of NDA personnel. PFP administration data management FSO-PFP-5-8, Volume 1, No. 16.2, was also provided, but this document did not indicate whether any default isotopic data were used by NDA personnel. Instead, it indicated that direct measurements were being used. Therefore, for the examined waste streams, no default isotopes are endorsed by AK personnel or used by NDA personnel. However, as observed at other sites, Hanford NDA personnel have historically obtained and used AK data with the knowledge of AK personnel, even though those data have not been formally approved. The use of unapproved AK-based isotopic values must not occur. Implementation of an AK-NDA memo like that mandated in

Section 4.4.18 of procedure CCP TP-005 would help ensure appropriate AK-NDA communication and would help mitigate the misuse of AK information.

Findings

The EPA inspection team did not identify any findings.

Concerns

The EPA inspection team identified four concerns. None of these concerns requires a response at this time; their status will be assessed during a future inspection.

AK Concern No. 1: The AK summaries would be more useful if they completely presented WMP and radiological information, since these are important to performance assessment, and should better reference supporting information for these elements. CH-WAC requirements must be addressed specifically. That is, the radionuclide discussions should be specific to the waste streams described and should provide general isotopic distributions, identification of the two most prevalent isotopes expected, and other CH-WAC requirements. In addition, although WMPs are presented, the source of the information discussed is not referenced, and it is difficult to determine the approximate distribution of WMPs within each container.

AK Concern No.2: The site provided examples of supplemental information, including a 2002 memorandum addressing the determination of the ^{90}Sr - ^{137}Cs ratio and the ^{234}U , ^{235}U , and ^{238}U ratio to comply with internal Hanford Certification Plan requirements. EPA has examined both of these documents under previous inspections. Both documents concern the use of TWINS as well as the Hanford Defined Waste Model. The documents basically conclude that while there may be limitations, the results are “representative of all wastes generated at the Hanford site.” However, the use of this information for waste sourced from RFETS requires additional justification, particularly since the RFETS ash in question was generated in a specific building (771), has specific EU and DU isotopic distributions associated with it by RFETS AK documentation, and may have additional information available for it sourced from ongoing (or recently completed) RFETS characterization of the same waste material.

AK Concern No. 3: Based on the information provided, no AK-based default isotopics are endorsed by AK personnel with respect to either the Hanford or RFETS ash waste. However, as observed at other sites, Hanford NDA personnel have historically obtained and used AK data with the knowledge of AK personnel, even though those data have not been formally approved. The use of unapproved AK-based isotopic values must not occur. Implementation of an AK-NDA memo like that mandated in CCP TP-005, Section 4.4.18, would help ensure appropriate AK-NDA communication and documentation and would help mitigate the misuse of unapproved AK information.

AK Concern No. 4: The AK accuracy report dated April 11, 2005, included a 13-page attachment that showed the radiological data inconsistency assessments for each container included in the AK performance evaluation. However, it is unclear from this information and

other documentation provided by the site the specific criteria that were used to evaluate radiological inconsistencies.

8.0 RESPONSE TO COMMENTS

EPA received one set of public comments in response to the *Federal Register* notice of November 30, 2004 (69 FR 69569). Below is EPA's response to the comments.

Comment No. 1: EPA must take stronger enforcement action so that both individual generator sites and CBFO are more aware of the need to improve their practices.

Response: *CBFO erroneously sent the PFP solids certification letter to Hanford, and it was the CBFO quality assurance (QA) program that detected the error, notified EPA, and immediately suspended the shipment of Hanford PFP solids to the WIPP. EPA concurred with the actions taken by DOE.*

EPA agrees that CBFO must be held to better practices. As the corrective action to minimize events like the Hanford incident, EPA required CBFO to establish a mechanism for better coordination of site audits and the waste certification decision. In its October 18, 2004, letter, DOE proposed the following corrective measures with which EPA agreed:

- *Impose new procedures for the creation, review and approval of the letters sent to sites authorizing them to begin the shipment of new categories of waste to the WIPP*
- *Develop a database to track correspondence and decisions regarding site audits and approvals*
- *Seek EPA review and approval of certification letters prior to sending them to the sites*

In addition, in its November 12, 2004, letter, EPA imposed an additional requirement to enhance the communication and coordination of WC activities. As a result, CBFO changed its management procedures (MPs), MP 10.3, "Audits," and MP 3.1, "Corrective Action Reports." Since March 2005, the EPA-approved changes to the MPs have been implemented. These changes have improved communication (e.g., discussion of audit scope, understanding of the site's corrective actions to address CBFO QA concerns, review of the CBFO certification letter by EPA) among EPA, CBFO, and the site. EPA believes that these steps would minimize the likelihood of sites disposing poorly characterized or unapproved waste in the WIPP repository.

Comment No. 2: EPA needs to provide a justification for its conclusion that the PFP waste posed no additional threat to human health.

Response: *At the time the waste was determined not to have EPA approval, the 600 Hanford PFP solid waste drums in question had been characterized using the EPA-approved radioassay*

procedures and equipment. DOE had identified and was able to track the radiological content in each drum. In addition, the TRU alpha contents of each of the 600 drums met the regulatory limit and the regulatory definition of TRU waste. The waste was properly containerized and met shipping requirements. Therefore, EPA determined that keeping the waste in the WIPP during the desk-top review did not pose an additional threat to human health.

Comment No. 3: EPA should require DOE to provide further information about how retrieval would be accomplished if it were required.

Response: *Primarily, retrieval of drums from the repository raises concerns related to worker health and safety and serves as a deterrent to a wrongful emplacement of improperly characterized TRU waste in the repository. EPA will examine the need for waste retrieval on a case-by-case basis. This event does not warrant, nor do EPA regulations require, a retrieval plan for such incidences.*

Comment No. 4: The Hanford situation is an example of why neither EPA nor the New Mexico Environment Department should reduce the existing WC requirements, when DOE cannot comply with existing requirements.

Response: *EPA is neither reducing, nor intends to reduce, the WC requirements at 40 CFR 194.24. TRU waste sites remain subject to these requirements, and EPA will continue to enforce them as demonstrated by this action.*

Comment No. 5: AK procedures at Hanford and elsewhere should more thoroughly review all AK documentation and better report discrepancies.

Response: *As part of the TRU site inspection process, EPA inspectors have insisted that sites require AK experts to compile comprehensive and complete AK documentation, including resolution of data discrepancies. In addition, at EPA's insistence, improved coordination and communication is occurring among the site personnel responsible for AK and radioassay activities, which has facilitated the resolution of data discrepancies and the reporting of accurate waste stream information.*

Comment No. 6: CBFO's checks should be completed BEFORE drums are shipped, so that the public health and environmental threats of shipping such wastes do not occur and to ensure that no suspect drums ever arrive at the WIPP.

Response: *As per EPA's November 12, 2004, letter, CBFO has implemented improved communication and coordination procedures. The changes made require EPA's review and concurrence of all CBFO site certification letters before they are issued. This will minimize the likelihood of CBFO issuing site certifications that do not comport with EPA's approvals of specific waste categories and site-specific TRU WC processes.*

9.0 SUMMARY OF RESULTS

The inspection team identified no findings and four concerns, none of which requires a response at this time. During the upcoming inspection, EPA will discuss these concerns with Hanford PFP AK staff and seek the site's response to address these concerns.

9.1 Findings

None.

9.2 Concerns

AK Concern No. 1: The AK summaries would be more useful if they completely presented WMP and radiological information, since these are important to performance assessment, and should better reference supporting information for these elements. CH-WAC requirements must be addressed specifically. That is, the radionuclide discussions should be specific to the waste streams described and should provide general isotopic distributions, identification of the two most prevalent isotopes expected, and other CH-WAC requirements. In addition, although WMPs are presented, the source of the information discussed is not referenced, and it is difficult to determine the approximate distribution of WMPs within each container.

AK Concern No.2: The site provided examples of supplemental information, including a 2002 memorandum addressing the determination of the ^{90}Sr - ^{137}Cs ratio and the ^{234}U , ^{235}U , and ^{238}U ratio to comply with internal Hanford Certification Plan requirements. EPA has examined both of these documents under previous inspections. Both documents concern the use of TWINS as well as the Hanford Defined Waste Model. The documents basically conclude that while there may be limitations, the results are "representative of all wastes generated at the Hanford site." However, the use of this information for waste sourced from RFETS requires additional justification, particularly since the RFETS ash in question was generated in a specific building (771), has specific EU and DU isotopic distributions associated with it by RFETS AK documentation, and may have additional information available for it sourced from ongoing (or recently completed) RFETS characterization of the same waste material.

AK Concern No. 3: Based on the information provided, no AK-based default isotopics are endorsed by AK personnel with respect to either the Hanford or RFETS ash waste. However, as observed at other sites, Hanford NDA personnel have historically obtained and used AK data with the knowledge of AK personnel, even though those data have not been formally approved. The use of unapproved AK-based isotopic values must not occur. Implementation of an AK-NDA memo like that mandated in CCP TP-005, Section 4.4.18, would help ensure appropriate AK-NDA communication and documentation and would help mitigate misuse of unapproved AK information.

AK Concern No. 4: The AK accuracy report dated April 11, 2005, included a 13-page attachment that showed the radiological data inconsistency assessments for each container included in the AK performance evaluation. However, it is unclear from this information and

other documentation provided by the site the specific criteria that were used to evaluate radiological inconsistencies.

9.3 Conclusions

EPA's independent inspection of personnel, procedures, and equipment at Hanford has led EPA to conclude that the Hanford WC program continues to meet the technical requirements of 40 CFR 194.24(c) regarding the WC systems and processes at Hanford listed below:

- AK—EPA concluded that the elements of the Hanford AK program examined during the inspection are technically adequate.

The EPA inspection team determined that Hanford's WC process of AK inspected for contact-handled, retrievably stored solid waste (S3000) adequately characterizes TRU waste in accordance with 40 CFR 194.24(c)(4).

The table below summarizes EPA's approvals of the Hanford's TRU WC processes.

WC Processes	WRAP Debris Waste	PFP Debris Waste	PFP Solid Waste
Acceptable Knowledge	Approved—June 2000	Approved—August 2002	Approved—June 2005
Nondestructive Assay	<ul style="list-style-type: none"> — Canberra GEA-A: Approved—June 2000 — Canberra GEA-B: Approved—August 2002 — IPAN A & B: Approved—August 2003 	<ul style="list-style-type: none"> — SGSAS in Room 172: Approved—August 2002 — SGSAS w/ANTECH AR-1 calorimeter: Approved—August 2003 — SGSAS w/ANTECH AR-5, AR-8, P-13, P-14, P-15, Q-1 calorimeters: Approved—October 2003 	<ul style="list-style-type: none"> — SGSAS w/ANTECH AR-1 calorimeter: Approved—August 2003 — SGSAS w/ANTECH AR-5, AR-8, P-13, P-14, P-15, Q-1 calorimeters: Approved—October 2003
Visual Examination & Real-Time Radiography	Approved—June 2000	Approved—April 2002	Approved—August 2003
WIPP Waste Information System	Approved—June 2000	Approved—June 2000	Approved—June 2000
Load Management	Not approved	Not approved	Not approved

Attachment A: Acceptable Knowledge Checklist for Inspection

Acceptable Knowledge Checklist for Inspection

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N/I	Objective Evidence/ Comment
<p>Procedures require staff to be:</p> <ul style="list-style-type: none"> familiar with applicable technical procedures familiar with QAOs qualified to assemble, compile, and confirm AK data 	WMP-400, Section 7.1.9, Acceptable Knowledge Documentation Management, Rev. 15, Dec 2003	<ul style="list-style-type: none"> Employee's explanation of job duties was consistent with applicable procedures Employee could identify the mandatory AK items for assembly Employee's identification of applicable procedures was correct Employee adequately explained how to assemble, compile, and confirm data Employees responsible for AK documentation were trained and qualified in accordance with applicable procedures 	I	TRU Project Training Summaries, September 18 and June 9, 2003. Reviewed training records of Mr. Scott Bisping. Without onsite inspection, it is not possible to verify that the AKE understands the training material and is adequately implementing the requirements of the AK program. During previous inspections, this same AKE was found to adequately understand his roles/responsibilities.
Procedures demonstrate a logical progression from general facility information to more detailed waste stream-specific information	WMP-400, Section 7.1.9, Acceptable Knowledge Documentation Management, Rev. 15, Dec 2003	<p>This logical sequence can be demonstrated through traceability analysis. (Traceability analysis and linkages may include but need not be limited to individual container data for radionuclides and waste material parameters, IDCs, and waste streams.)</p> <p>AK documentation is traceable to the drum level</p>	Y	WSPFs RLRFETS.001; MHASG01, M4T00-TRU-04-0468 and 067; M4T00-DCD-03-489.1; RFETS AK, Incinerator Ash Rev. 6; BDRs for containers 30443, 30439, 30310, 30369, 30370, 30438. Data are generally traceable from WSPF to BDRs; individual historic travelers not provided, but in previous inspections we examined this type of documentation and assume that it is still available.
Procedures for AK processes are consistent with each other	WMP-400, Section 7.1.9, Acceptable Knowledge Documentation Management, Rev. 15, Dec 2003; HNF-2599, Hanford Site Quality Assurance Plan	Procedures for AK processes are implemented consistently	Y	Older version of QAPP examined; is consistent taking into account the need for changes to QAPP to comply with WAP/WAC.

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N/I	Objective Evidence/ Comment
<p>The site's TRU waste management program has procedures to determine:</p> <ul style="list-style-type: none"> waste categorization schemes (e.g., consistent definitions of waste streams) and terminology breakdown of the types and quantities of TRU waste generated/stored at the site how waste is tracked and managed at the generator site (including historical and current operations) 	WMP-400, Section 7.1.9, Acceptable Knowledge Documentation Management, Rev. 15, Dec 2003; WMP Section 7.1.7, Container Management Procedures, Rev. 15		Y	WSPFs RLRFETS.001; MHASG01, M4T00-TRU-04-0468 and 067; M4T00-DCD-03-489.1; RFETS AK, Incinerator Ash Rev. 6; BDRs for containers 30443, 30439, 30310, 30369, 30370, 30438. FSP-PFP-5-8, Vol. 2, No. 16.2. Process used to track/manage containers at the site could not be examined first hand, but it is assumed that it is still satisfactory as determined in previous inspections. Waste stream definition in case of ash streams is appropriate.
<p>Procedures call for AK information to be collected for:</p> <ul style="list-style-type: none"> ^{241}Am, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{233}U, ^{234}U, ^{238}U, ^{90}Sr, ^{137}Cs, and unexpected radionuclides ferrous metals (in containers) cellulosics, plastics, rubber nonferrous metals (in containers) <p>From CH-WAC:</p> <ul style="list-style-type: none"> specify isotopes/quantities defined by AK <p>Must be appropriate and result in unbiased values for cumulative activity and mass of radionuclides</p>	WMP-400, Section 7.1.9, Acceptable Knowledge Documentation Management, Rev. 15, Dec 2003	<p>AK information is collected for:</p> <ul style="list-style-type: none"> ^{241}Am, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{233}U, ^{234}U, ^{238}U, ^{90}Sr, ^{137}Cs, and unexpected radionuclides ferrous metals (in containers) cellulosics, plastics, rubber nonferrous metals (in containers) <p>From CH-WAC: Is AK information collected for isotopes?</p>	N	<p>TRU-SP001.4.3-0408200231426; TRU-SP001.4.1-0408200226866; TRU-SPO-11.4.1-0817200045262; MRT00-PJC-02-077; M4T00-DCD-03-062; evaluations of $^{234}\text{U}/^{90}\text{Sr}$; AK information from RFETS, incinerator ash (including WSPF); M4T00-TRU-04-067, 068, 456.1.</p> <p>The AK summaries should more completely present waste material parameter and radiological information, since these are important to performance assessment, and should better reference supporting information for these elements. CH-WAC requirements must be addressed specifically. That is, the radionuclide discussions should be specific to the waste streams described and should provide general isotopic distributions, identification of the two most prevalent isotopes expected, and other CH-WAC requirements</p>

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N/I	Objective Evidence/ Comment
Procedures require documentation of radionuclide process origin	WMP-400, Section 7.1.9, Acceptable Knowledge Documentation Management, Rev. 15, Dec 2003	Identified radionuclides and their isotopic distributions are consistent and accurate	Y, in part	TRU-SP001.4.3-0408200231426; TRU-SP001.4.1-0408200226866; TRU-SPO-11.4.1-0817200045262; MRT00-PJC-02-077; M4T00-DCD-03-062; evaluations of $^{234}\text{U}/^{90}\text{Sr}$; AK information from RFETS, incinerator ash (including WSPF); M4T00-TRU-04-067, 068, 456.1. Process origin is well documented. Based on information provided, it is evident that AK-based default isotopics are not endorsed by AK personnel for either Hanford or RFETS ash waste. However, as observed at other sites, Hanford NDA personnel have historically obtained and used unapproved AK data with the knowledge of AK personnel. The use of unapproved AK isotopic data must not occur. Implementation of an AK-NDA memo such as CCP-TP-005, Section 4.4.18, would help ensure appropriate AK-NDA communication and would help mitigate the misuse of AK.
	WMP-400, Section 7.1.9, Acceptable Knowledge Documentation Management, Rev. 15, Dec 2003	Radionuclides identified by AK and isotopic distributions are provided to NDA/Radioassay personnel If AK data are provided to NDA personnel, data are available to operators prior to determination of isotopic quantities. Data use and limitations are well defined (refer to NDA checklist)	N	See above

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N/I	Objective Evidence/ Comment
<p>Procedures require:</p> <ul style="list-style-type: none"> • <u>Assembling</u> AK information • <u>Compiling</u> AK documentation into an auditable record (the process should include review of AK information to determine the waste material parameters and radionuclides present, as well as source info discrepancy resolution) • <u>Assigning</u> waste streams/waste matrix codes • <u>Identifying</u> physical forms, waste material parameters, and radionuclides (including, if possible, isotopic ratios) • <u>Resolving</u> data discrepancies • <u>Identifying</u> management controls for discrepant items/containers/waste streams • <u>Confirming</u> AK information with other analytical results (done by comparing AK characterization data with that obtained through NDE and/or visual examination, including discrepancy resolution) • <u>Auditing</u> of AK records 	<p>WMP-400, Section 7.1.9, Acceptable Knowledge Documentation Management, Rev. 15, Dec 2003</p>	<p>Compilation of AK documentation is adequately demonstrated</p> <p>Discrepancies are adequately resolved</p>	<p>Y</p>	<p>M4T00-DCD-02-228; M4T00-PJC-02-076; TRU-SPO-11.4.1-0408200226866; TRU SPO-11.4.3-0408200231426; TRU-SPO-11.9-0723200432715; M4T00-DCD-03-062; ⁹⁰Sr, ¹³⁷Cs memo, dated April 11, 2002; TRI-SPO-11.4.1-0817200045262; Interoffice Memo; AK information on TRM incinerator ash, dated June 9, 2004; M4T00-TRU-04-467, 468; M4T00-DCD-03-489.1; AK Re-Evaluation Checklist; M4T00-TRU-04-456.1; TRU-SPO-11.4.4-0226200132290; TRU-SPO-11.9-0619200338439</p> <p>Isotopic information is the same for both the RFETS and Hanford ash, even though they have different sources. Justification for this assignment is warranted.</p>

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N/I	Objective Evidence/ Comment
<p>From CH-WAC:</p> <ol style="list-style-type: none"> 1. If AK was used (i.e., data collected prior to QA program), what method was employed to qualify—peer review, corroborating data, confirmatory testing, QA program equivalency? 2. At a minimum, to confirm existing AK data, it is necessary to compare ratios of the two most prevalent radionuclides in the isotopic mix 3. ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Pu, and ^{242}Pu and ^{241}Am: <ul style="list-style-type: none"> — Confirmation can be accomplished via comparison of measured and AK values for $^{239}\text{Pu}/^{240}\text{Pu}$ for WG Pu; $^{238}\text{Pu}/^{239}\text{Pu}$ for heat source — Measured ^{241}Pu can be used to calculate ^{241}Pu (for subsequent AK comparison) if time of chemical separation is known (no ^{241}Am at time of separation assumed) — ^{241}Pu can be compared (by ratio) to confirm AK of any plutonium isotope associated with WG Pu/reactor-grade plutonium (i.e., ^{239}Pu or ^{240}Pu) — ^{238}Pu from AK for WG Pu/reactor-grade plutonium is assumed to be valid if the AK values of ^{239}Pu and ^{240}Pu have been confirmed by measurement — ^{242}Pu calculated by correlation techniques since it cannot be measured 	<p>WMP-400, Section 7.1.9, Acceptable Knowledge Documentation Management, Rev. 15, Dec 2003</p>	<p>AK confirmation based on NDE and/or visual examination is adequately demonstrated</p>	<p>Y, in part</p>	<p>M4T00-DCD-02-228; M4T00-PJC-02-076; TRU-SPO-11.4.1-0408200226866; TRU-SPO-11.4.3-0408200231426; TRU-SPO-11.9-0723200432715; M4T00-DCD-03-062; $^{90}\text{Sr}/^{137}\text{Cs}$ memo, dated April 11, 2002; TRI-SPO-11.4.1-0817200045262; Interoffice Memo; AK information on TRM incinerator ash, dated June 9, 2004; M4T00-TRU-04-467, 468; M4T00-DCD-03-489.1; AK Re-Evaluation Checklist; M4T00-TRU-04-456.1; TRU-SPO-11.4.4-0226200132290.</p> <p>It is assumed that all data are measured and that no default isotopics are used, although the Hanford Defined Waste Model may be used for Hanford ash—this model was assessed in previous inspections and was not reevaluated as part of this analysis. Note that the WSPFs AK summaries list the same isotopics for both ashes, but this is not justified. In addition, it is apparent that confirmatory testing is used, and it also shows that collection and use of real-time RFETS information, with respect to assay, was attempted. It is recommended that an AK-NDA memo be prepared that explicitly describes how AK isotopics are/are not used by measurement personnel. As previously stated, the two most prevalent nuclides and other CH-WAC requirements should be addressed.</p>

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N/I	Objective Evidence/ Comment
<p>4. ^{233}U, ^{234}U, ^{235}U, and ^{238}U:</p> <p>Were they tracked or measured in AK information?</p> <p>— If no valid AK exists, data generated can only be used to detect or calculate, or confirm absence - ratios for ^{234}U calculated from ^{235}U enrichment</p> <p>— If valid AK exists, can confirm with certified systems</p> <p>— ^{234}U calculated by ^{235}U enrichment because ^{234}U cannot be measured</p> <p>5. ^{137}Cs and ^{90}Sr:</p> <p>Confirmed by WIPP certified system (direct measurement or comparison of ^{241}Am peak at 662 kv to other ^{241}Am peaks (disproportionate ^{241}Am peak at 662 kv could mean presence of ^{137}Cs)</p> <p>^{90}Sr calculated from ^{137}Cs using scaling factors</p> <p>6. Other radionuclides:</p> <p>— Must be identified via NDA and should be identified via AK</p>	<p>WMP-400, Section 7.1.9, Acceptable Knowledge Documentation Management, Rev. 15, Dec 2003</p>			<p>TRU-SPO-11.4.1-0408200226866; TRU-SPO-11.4.3-0408200231426; M4T00-PJC-02-077; Interoffice Memo re $^{90}\text{Sr}/^{137}\text{Cs}$, dated April 11, 2002; evaluations of ^{234}U and ^{90}Sr preliminary results with graphs.</p>

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N/I	Objective Evidence/ Comment
<p>Procedures require that:</p> <ul style="list-style-type: none"> • AK information be compiled in an auditable record, including a road map for all applicable information • A reference list be provided that identifies documents, databases, QA protocols, and other sources of information that support AK information • The overview of the facility and TRU waste management operations in the context of the facility's mission be correlated to specific waste stream information • Correlations between waste streams, with regard to time of generation, waste generating processes, and site-specific facilities be clearly described. For newly generated wastes, the rate and quantity of waste to be generated shall be defined • Nonconforming waste be segregated 	<p>WMP-400, Section 7.1.9, Acceptable Knowledge Documentation Management, Rev. 15, Dec 2003</p>	<ul style="list-style-type: none"> • AK information is compiled in an auditable record, including a road map for all applicable information • A reference list is provided that identifies documents, databases, QA protocols, and other sources of information that support AK information • The overview of the facility and TRU waste management operations in the context of the facility's mission is correlated to specific waste stream information • Correlations between waste streams, with regard to time of generation, waste generating processes, and site-specific facilities is clearly described. For newly generated wastes, the rate and quantity of waste to be generated are defined • Nonconforming waste is segregated 	<p>Y</p>	<p>HNF-3561, Draft Rev. 7; M4T00-TRU-04-456.1; M4T00-DCD-02-228; M4T00-PJC-02-076; TRU-SPO-11.4.1-0408200226866; TRU-SPO-11.4.3-0408200231426; TRU-SPO-11.9-0723200432715; M4T00-DCD-03-062; ⁹⁰Sr/¹³⁷Cs memo, dated April 11, 2002; TRI-SPO-11.4.1-0817200045262; Interoffice Memo; AK information on TRM incinerator ash, dated June 9, 2004; M4T00-TRU-04-467, 468; M4T00-DCD-03-489.1; AK Re-Evaluation Checklist; M4T00-TRU-04-456.1; TRU-SPO-11.4.4-0226200132290; TRU-SPO-11.9-0619200338439.</p> <p>No NCRs identified that required waste segregation. Waste quantities defined. Several documents present information pertaining to mandatory or supplemental information.</p>

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N/I	Objective Evidence/ Comment
<p>Procedures require that the following information will be included in the AK record:</p> <ul style="list-style-type: none"> • Map of the site that identifies the areas and facilities involved in TRU waste generation, treatment, and storage • Facility mission description related to TRU waste generation and management • Description of the operations that generate TRU waste at the site and process information, including: <ul style="list-style-type: none"> — Area(s) or building(s) from which the waste stream was or is generated — Estimated waste stream volume and time period of generation — Waste generating process description for each building or area — Process flow diagrams, if appropriate — Generalized material inputs or other information that identifies the radionuclide content of the waste stream and the physical waste form • Types and quantities of TRU waste generated, including historical generation through future projections <p>From CH-WAC:</p> <ul style="list-style-type: none"> • waste identification/categorization schemes relevant to the isotopic composition of waste and description of isotopic composition of each waste stream • physical/chemical waste composition that could affect isotopic distribution (i.e., processes to remove ingrown ²⁴¹Am) • statement of all numerical adjustments applied to derive the material's isotopic distribution (e.g. scaling factors, decay/ingrowth corrections and secular equilibrium considerations) • specification of isotopic ratios for the 10 WIPP-tracked radionuclides and, if applicable, the radionuclides that comprise 95% of the radiological hazard 	<p>WMP-400, Section 7.1.9, Acceptable Knowledge Documentation Management, Rev. 15, Dec 2003</p>	<p>The following information is included in the AK record:</p> <ul style="list-style-type: none"> • Map of the site that identifies the areas and facilities involved in TRU waste generation, treatment, and storage • Facility mission description related to TRU waste generation and management • Description of the operations that generate TRU waste at the site and process information, including: <ul style="list-style-type: none"> — Area(s) or building(s) from which the waste stream was or is generated — Estimated waste stream volume and time period of generation — Waste generating process description for each building or area — Process flow diagrams, if appropriate — Generalized material inputs or other information that identifies the radionuclide content of the waste stream and the physical waste form • Types and quantities of TRU waste generated, including historical generation through future projections <p>From CH-WAC:</p> <ul style="list-style-type: none"> • waste identification/categorization schemes relevant to the isotopic composition of waste and description of isotopic composition of each waste stream • physical/chemical waste composition that could affect isotopic distribution (i.e., processes to remove ingrown ²⁴¹Am) • statement of all numerical adjustments applied to derive the material's isotopic distribution (e.g. scaling factors, decay/ingrowth corrections and secular equilibrium considerations) • specification of isotopic ratios for the 10 WIPP-tracked radionuclides and, if applicable, the radionuclides that comprise 95% of the radiological hazard 	<p>Y, in part</p>	<p>See documents above. Also HNF-3461, draft Rev. 7; M4T00-TRU-04-468; M4T00-DCD-03-062; M4T00-DCD-03-097; M4T00-TRU-03-534.</p> <p>See previous questions pertaining to comparability of the isotopic composition of the two ashes, including applicability of the Defined Waste Model to RFETS ash.</p>

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N/I	Objective Evidence/ Comment
The site has procedures for the collection of supplemental information	WMP-400, Section 7.1.9, Acceptable Knowledge Documentation Management, Rev. 15, Dec 2003	<p>Samples of supplemental information are sufficiently detailed and are appropriate to the waste being characterized</p> <p>From CH-WAC: Examples of supplemental information include:</p> <ul style="list-style-type: none"> • safeguards and security and other material control systems/programs • reports of nuclear safety or criticality, accidents involving SNM • waste packaging, waste disposal, building or nuclear material management area logs or inventory records, site databases that provide SNM or nuclear material information • test plans, research project reports, or laboratory notebooks that describe the radionuclide content of materials used in experiments • information from site personnel • historical analytical data relevant to isotopic distribution of the waste stream 	Y	<p>HNF-3561, draft Rev. 7; M4T00-TRU-04-456.1; M4T00-DCD-02-228; M4T00-PJC-02-076; TRU-SPO-11.4.1-0408200226866; TRU-SPO-11.4.3-0408200231426; TRU-SPO-11.9-0723200432715; M4T00-DCD-03-062; ⁹⁰Sr/¹³⁷Cs memo dated April 11, 2002; TRI-SPO-11.4.1-0817200045262; Interoffice Memo; AK information on TRM incinerator ash, dated June 9, 2004; M4T00-TRU-04-467, 468; M4T00-DCD-03-489.1; AK Re-Evaluation Checklist; M4T00-TRU-04-456.1; TRU-SPO-11.4.4-0226200132290; TRU-SPO-11.9-0619200338439.</p> <p>Supplemental information available including examples of those cited in CH-WAC.</p>
Site documents/procedures require the facility prepare an AK summary document that summarizes all information collected, including the basis for all waste stream designations	WMP-400, Section 7.1.9, Acceptable Knowledge Documentation Management, Rev. 15, Dec 2003	The AK summary is available for EPA review and contains the required information, including the basis for all waste stream designations	Y, in part	<p>WSPF for RLRFETS.001 and RLMHASH.01; AK summaries attached. Documents M4T00-TRU-04-0468, 467 also provide RFETS and Hanford ash AK information. Note that the AK summary is identical with respect to the isotopics for each waste stream (additional justification is required), and waste material parameter content of the ashes requires additional elucidation.</p>
Site procedures require that additional information be collected before waste may be shipped if the required AK information is not available for a waste stream	WMP-400, Section 7.1.9, Acceptable Knowledge Documentation Management, Rev. 15, Dec 2003	Additional information is collected before waste may be shipped if the required AK information is not available for a waste stream	Y	Required AK information available to date for the RFETS and Hanford ashes.

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N/I	Objective Evidence/ Comment
<p>The site has a written procedure for the confirmation of AK information using analytical data, including NDA/NDE and/or VE</p> <p>This procedure applies to both retrievably stored and newly generated waste</p> <p>This procedure requires a reevaluation of AK if NDE/NDA or VE identify it to be a different waste matrix code. This procedure describes how the waste must be reassigned, based on the AK reevaluation</p>	<p>WMP-400, Section 7.1.9, Acceptable Knowledge Documentation Management, Rev. 15, Dec 2003</p>	<p>AK information is confirmed using analytical data, including NDA/NDE and/or VE</p> <p>Has the AK expert calculated the percent changes in matrix parameter categories (MPCs) based on AK and NDE/VE? Were accuracy evaluations assigned? Are these acceptable?</p>	<p>Y</p>	<p>M4T00-TRU-04-456.1; AK Re-Evaluation Checklist; Hanford Ash and Silver Toxicity; M4T00-DCD-05-282.</p> <p>AK confirmation checklist completed for waste; no reevaluation required to date except for a RCRA toxicity reevaluation. Accuracy evaluations. Performance reports.</p>
<p>Procedures require the following steps to be followed if wastes are reassigned to a different waste matrix code based on NDA/NDE or VE:</p> <ul style="list-style-type: none"> • Review existing information based on the container identification number and document all differences • Reassess and document all analytical data associated with the waste • Reevaluate waste material parameter determinations and document any changes • Reevaluate the radionuclide content and document any changes • Verify and document that the reassigned waste matrix code was generated within the specified time period, area and buildings, waste generating process, and that the process material inputs are consistent with the waste material parameters identified during radiography or VE • Record all changes to AK records • If discrepancies exist in the AK information for the reassigned waste matrix code, complete a nonconformance report, document the segregation of this container, and define the corrective actions necessary to fully characterize the waste 	<p>WMP-400, Section 7.1.9, Acceptable Knowledge Documentation Management, Rev. 15, Dec 2003</p>	<p>The following steps are followed if wastes are reassigned to a different waste matrix code:</p> <ul style="list-style-type: none"> • Review existing information based on the container identification number and document all differences • Reassess and document all analytical data associated with the waste • Reevaluate waste material parameter determinations and document any changes • Reevaluate the radionuclide content and document any changes • Verify and document that the reassigned waste matrix code was generated within the specified time period, area and buildings, waste generating process, and that the process material inputs are consistent with the waste material parameters identified during radiography or VE • Record all changes to AK records • If discrepancies exist in the AK information for the reassigned waste matrix code, complete a nonconformance report, document the segregation of this container, and define the corrective actions necessary to fully characterize the waste 	<p>Y</p>	<p>No reevaluation required to date except for addition of toxicity code (silver).</p>

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N/I	Objective Evidence/ Comment
The site has procedures for shipment revocation and procedures for notification of CAO when a container is revoked	WMP-400, Section 7.1.9, Acceptable Knowledge Documentation Management, Rev. 15, Dec 2003	Has a waste stream been revoked based either on AK information or reassessment as part of reconfirmation? If so, was the procedure(s) followed?	Y	Note that shipment of AK solids ceased when EPA notified (EPA had not yet approved solids summary waste category group).
Until discrepancies are resolved, shipment of the waste stream to the WIPP is prohibited	WMP-400, Section 7.1.9, Acceptable Knowledge Documentation Management, Rev. 15, Dec 2003	If data consistently indicate discrepancies with AK information, the site increases sampling, reassesses the materials and processes that generate the waste, and resubmits waste stream profile information	Y	No examples to date.